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IDA MEMORANDUM REPORT M-408

STARS REPOSITORY BIBLIOGRAPHY
VERSION 1.1

Catherine W. McDonald
Teresa L. Anderson

January 1988

Prepared for
STARS Joint Program Office

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13. ABSTRACT (Maximum 200 words) IDA Memorandum Report M-408, STARS Repository Bibliography Version 1.1, provides bibliographic sources for the concept paper, STARS Repository Guidebook Version 1.1, IDA Memorandum Report M-385. The Software Technology for Adaptable, Reliable Systems (STARS) Program plans to establish a repository for the storage and distribution of reusable software modules, accompanying documentation, and software management tools. This bibliography includes supplemental references which may be of assistance to the STARS Program and the prime contractors in the establishment and maintenance of the STARS repository.				
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TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION.....	1
1.1 Purpose	1
1.2 Scope.....	1
1.3 Background.....	2
1.4 Approach.....	2
2.0 BIBLIOGRAPHY	3

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this IDA Memorandum Report is to provide bibliographic sources for the concept paper, *STARS Repository Guidebook: Version 1.1*, IDA Memorandum Report M-385. The Software Technology for Adaptable, Reliable Systems (STARS) project plans to establish a repository for the storage and distribution of reusable software modules, accompanying documentation, and software management tools. This repository will be maintained by a prime contractor who will be responsible for the upkeep of the repository, and although the repository will be primarily for the STARS community, it will also be made available to other interested parties. This bibliography includes supplemental references which may be of assistance to the STARS Program Office and the prime contractors in the establishment and maintenance of the STARS repository.

1.2 SCOPE

Research for the STARS repository was based on the stated requirements for the repository's operation, as detailed in IDA Memorandum Report, M-385, *STARS Repository Guidelines, Version 1.1*, Section 2.0. The research was limited primarily to the following areas: the Ada programming language, computer networks, information storage and retrieval, software libraries and library management, software reliability, software repositories, and software reusability. The following repositories were examined to determine their potential applicability to the STARS project:

- Defense Data Network (DDN), the largest operational software repository, managed by the Defense Communications Agency (DCA),
- Computer Software Management and Information Center (COSMIC), established by the National Aeronautics and Space Administration (NASA), and
- National Software Works, a project at the Rome Air Development Center (RADC).

1.3 BACKGROUND

As the cost of software development has escalated, the need for reliable software components which are also reusable, has increased. The object of the STARS project is to provide a means whereby Ada software modules can be easily accessed and reused by the STARS community, thus reducing both development time and cost. The repository's prime contractor will be expected to host the repository in a MILNET-accessible environment, and establish a viable method for searching, retrieving, and maintaining the software. Specific details of the repository requirements are in IDA Memorandum Report, M-385.

1.4 APPROACH

In preparing the bibliography, research was conducted using engineering, computer science, and technical journal databases found on the DIALOG information retrieval system. Each reference was examined to determine its appropriateness to the repository's development. When a certain degree of relevance was established, an entry was made in a master database. Each entry consisted of general bibliographic information, an abstract, keywords, and an Association for Computing Machinery (ACM) classification. The abstract was taken from DIALOG when available, as were most of the keyword assignments. For those references which did not have an abstract readily available, or a sufficient number of keywords, these were written by one of the authors. The ACM classifications were also assigned by one of the authors, based on the ACM Classification Scheme dated 15 Jan 1987.

Before defining the components of the STARS repository, several existing repositories were examined to determine the fundamental requirements for the repository. These other repositories will be described in detail in Section 4.0 of IDA Memorandum Report, M-385, *STARS Repository Guidelines: Version 1.2*, scheduled for publication in April 1988. Several operational retrieval systems were evaluated to establish whether a current retrieval methodology was applicable to STARS, or if a new approach to the storage and retrieval concept was needed. This recommendation will also be made in IDA Memorandum Report, M-385, *STARS Repository Guidelines: Version 1.2*.

2.0 STARS REPOSITORY BIBLIOGRAPHY

Allen, K.W. "Implementation and Management of a Software Lending Library." In *SIGUCCS Newsletter* 15/1. (Spring 1985): 26-29 Cornell University, Ithaca, NY

The article discusses the problems of developing a software library, such as licensing laws. At Cornell University where the system was first implemented the response by the software industry as a whole was slow. However, the scheme is now a partial success. (INSPEC - Database of Institute of Electrical Engineers, UK)

KEYWORDS: Software Libraries

ACM CLASS: H.3.4 [Information Storage and Retrieval]: Systems and Software - Information Networks

Anderson, C. "The Ins and Outs of Indexing." In *PC (Independent Guide to IBM Personal Computers)* 4/8. (April 16, 1985): 321-322

Micro Indexing System (\$600), from Compugramma, P.O. Box 60, Cranbury New Jersey 08512, facilitates the creation of book indexes. The program follows The Chicago Manual of Style, and is simple and flexible. Function keys speed up the processes of entering headings and subheadings. The index can be listed alphabetically at any point. When all entries have been made, a menu allows a choice of methods of listing. (The Computer Database™)

KEYWORDS: Indexing; Automatic Indexing; Citation Indexing; Index Generation; Document Preparation; Software

ACM CLASS: H.3.1 [Information Storage & Retrieval]: Content Analysis & Indexing - Indexing Methods

Association for Computing Machinery. "Additions from 1983 to 1987 Version of CR Classification Scheme". In ACM's *Computing Reviews*, 28/1. (January 1987): 5-46.

The objectives of the original ACM Classification Scheme of 1982 were to provide a classification system which a) reflects the current state of the computer field; b) somewhat reflects the expectations of the field for the next ten years; and, c) contains a mechanism to easily change and improve the scheme without requiring a major overhaul.

The classification system is based on a tree diagram with four levels of detail. This article contains the updates made to the 1983 scheme to make it current for 1987.

KEYWORDS: Classification Scheme; Computer Terminology

ACM: H.3.2 [Information Storage & Retrieval]: Information Storage - Record Classification

Baldo, James Jr. and David O. LeVan. *Effects of Transition from DoD to ISO OSI Communication Protocols*. (July 1987): Institute for Defense Analyses, Alexandria, VA.

The purpose of this paper is to provide the Joint Chiefs of Staff, Command Control and Communications System Joint Requirements Integration (C3SJ) effort with an analysis of the effects of the transition from Department of Defense communications protocols to the International Standards Organization (ISO) Open Systems Interconnect (OSI) communications protocols.

KEYWORDS: Communication Protocols; Software Standards

ACM CLASS: D.2.0 [Software Engineering]: General - Standards

Biggerstaff, T. and C. Richter. "Reusability Framework Assessment, and Directions." In *IEEE Software* 4/2. (March 1987): 41-49. Microelectronics and Computer Technology Corp., Austin, Texas

The authors address the question of software reusability from the technology viewpoint. They examine the technologies, either mature or emerging that are available to address reusability, how they work, and how they differ. A framework is given for classifying the available technologies into those that are compositional and those that are generational. (INSPEC - Database of Institute of Electrical Engineers, UK)

KEYWORDS: Reusable Software

ACM CLASS: D.2.m [Software Engineering]: Miscellaneous - Reusable Software

Bills, R. "Setting Up an Electronic Bulletin Board." In *Small Computers for Libraries* 6/7. (July-August 1986): 28-29. West Virginia College of Graduate Studies, Morgantown, WV

The West Virginia College of Graduate Studies Library Services maintains an electronic bulletin board for the use of its faculty, staff, and students. The bulletin board allows posting of general bulletins, sending of public or private messages to any other user, and uploading or downloading of public domain software or other files. Setting up and running the board takes only a little effort and prior knowledge of microcomputers. Suggestions are given to help set up a bulletin board. (INSPEC - Database of Institute of Electrical Engineers, UK)

KEYWORDS: Electronic Bulletin Board; Information Services

ACM CLASS: D.4.4 [Operating Systems]: Communication Management - Message Sending

Boutocoff, D.A. "DDN Evolves to Meet Interoperability, Security Needs." In *Defense Electronics* 18/4. (April 1986): 59-60.

The Defense Data Network (DDN) is the DoD's worldwide packet-switched common-user network for data communications. The system represents an effort to build upon several existing military packet-switch networks and, reflecting an overall telecommunications trend, to interconnect previously isolated computer systems and local area networks into an integrated wide area network for long-haul data communications. (INSPEC - Database of Institute of Electrical Engineers, UK)

KEYWORDS: Defense Data Network; Computer Security

ACM CLASS: C.2.0 [Computer-Communication Networks]: General - Security and Protection

Brunelle, Bette S. "The Production of a Full-Text Database." In *National Online Meeting Proceedings 1985*. (April 30-May 2 1985): 71-78

Outlines what a full text data base is in technical terms, how that may differ from a user's standpoint, and what the design issues are in either case. Discusses the implications of full text for electronic publishing-how print publishers will be changing editorial procedures to encompass standard and on-line publishing and how system designers will simultaneously have to view text as meaningful text, rather than as just lots of text. (LISA - Library Association Publications, LTD, UK)

KEYWORDS: Automatic Indexing; Full Text Searching; Data Bases; Electronic Media; On-line Information Retrieval; Computerized Information Storage and Retrieval

ACM CLASS: H.3.1 [Information Storage & Retrieval]: Content Analysis & Indexing - Indexing Methods

Clapp, J. "Software Reusability: A Management View." In *IEEE COMPSAC Proceedings*. 479-480. MITRE Corp., Bedford, MA

The author discusses some of the management issues involved in achieving widespread reuse of software. These include organizational issues, standards, and motivation. (COMPENDEX)

KEYWORDS: Reusable Software; Software Management

ACM CLASS: D.2.m [Software Engineering]: Miscellaneous - Reusable Software

Cohen, L.S. and W.J. Miller. *Defense Data Network Support Concept Analysis*. (January 1985): 1-26. Dynamics Research Corp., Wilmington, MA.

This final technical briefing presents an outline form of the data in the final report with the same name, dated 26 December 1984.

KEYWORDS: Defense Data Network; Logistics Support

ACM CLASS: A.2 [General Literature]: Reference - Conceptual Analysis

Conklin, Jeff. Hypertext: An Introduction & Survey." In *IEEE*. (September 1987):17-40. Microelectronics & Computer Technology Corp.

Most modern computer systems share a foundation which is built of directories containing files. The files consist of text which is composed of characters. The text that is stored within this hierarchy is linear. For much of our current way of doing business, this linear organization is sufficient. However, for more and more applications, a linear organization is not adequate.

As workstations grow cheaper, more powerful and more available, new possibilities emerge for extending the traditional notion of "flat" text files by allowing more complex organizations of the material. Mechanisms are being devised which allow direct machine-supported references from one textual chunk to another; new interfaces provide the user with the ability to interact directly with these chunks and to establish new relationships between them. These extensions of the traditional text fall under the general category of hypertext (also known as non-linear text.)

KEYWORDS: Non-Linear Text; Hypertext; Searching Methods

ACM CLASS: H.2.1 [Database Management]: Logical Design - Data Models

Conn, Richard. "Overview of the DoD Ada Software Repository." In *Dr. Dobb's Journal* 11/2. (February 1986):60-61.

Describes the types of information on Ada that can be found on the SIMTEL20 computer on the Defense Data Network. Types include general information, reusable components, software development aids, communications software, graphics and display tools, and other topics. Reports on how to get software from the Ada Software Repository. (Microcomputer Index)

KEYWORDS: Software Repositories; Ada Programming Language

ACM CLASS: D.2.2 [Software Engineering]: Tools and Techniques - Software Libraries

Conn, Richard. *The Ada Software Repository and The Defense Data Network*. New York, New York: Crane Duplicating Service, 1987.

This book introduces its readers to the operation and resources of the Internet, with particular emphasis on the Ada Software Repository on SIMTEL20. The book provides current answers, and pointers to future answers, to such questions as: What facilities are available on the Internet? How can the user access them? How can the user keep up with them and adapt as they change? This book is not comprehensive; however, it does present answers to many fundamental questions and, perhaps more importantly, it provides pointers to the ways in which the reader will be able to use the available resources in order to find the answers to questions that have not been asked.

KEYWORDS: Ada Software Repository; Defense Data Network

ACM CLASS: D.2.2 [Software Engineering]: Tools and Techniques - Software Libraries

Coombs, James H., Allen H. Renear, and Steven J. DeRose. "Markup Systems and the Future of Scholarly Text Processing". In *Communications of the ACM*. 30/11 (November 1987): 933-

In the last few years, scholarly text processing has entered a reactionary stage. Previously, developers were working toward systems that would support scholars in their roles as researchers and authors. Since the introduction of inexpensive and powerful personal computers, we have seen a change in focus away from developing such new strategies toward finding ways to do the old things faster.

KEYWORDS: Text Processing; Computer Aided Searches

ACM CLASS: I.7.2 [Text Processing]: Document Preparation - Format & Notation

Craven, Timothy C. "An On-Line Index Entry Format Based on Multiple Search Terms."
In *Journal of Documentation* 43/1 (March 1987): 46-53.

Describes a microcomputer-based string index format generated from concept networks using multiple search terms. Link weighting is highlighted as a method to decide which term appears first so the entry reflects the classification implied by the search specification. The computer software used for this system is briefly described. (ERIC, Department of Education)

KEYWORDS: Automatic Indexing; Search Strategies; Weighted Term Searching

ACM CLASS: H.3.3 [Information Storage & Retrieval]: Information Search & Retrieval - Search Process

De Vere, R., M.S. Larow, K.A. Napier, and L. Passmore. *DDN (Defense Data Network) Course*. Fairfax, VA: Network Strategies, Inc., April 1986.

The purpose of this course is to provide the DDN user community with sufficient technical and program information to enable the users to obtain effective data communications service through the DDN and to meet DoD interoperability requirements. The Course is organized into four sections: Functional Requirements for Data Communications; Introduction to Computer Network Architectures; The Defense Data Network and the DoD Protocol Suite; and the DDN: Strategies for Subscribers.

KEYWORDS: Defense Data Network; Communications Networks

ACM CLASS: A.1 [General Literature]: Introductory and Survey - Communication Networks

Dennett, S.C., E.J. Feinler, F. Perillo, M.K. Stahl, and C.A. Ward. *DDN (Defense Data Network) New User Guide*. Menlo Park, CA: DDN Network Information Center, SRI International, December 1985.

Information of interest to new users of the Defense Data Network (DDN) is contained in this document. It explains the DDN environment and the history in general first, then emphasizes points relevant to the MILNET network either through a terminal attached to a host computer or through a TAC (Terminal Access Controller). The need and process for registering users is explained. In addition, instructions are provided for taking advantage of some of the most useful network features, such as various mail systems, FTP (File Transfer Protocol), and Telnet. WHOIS, TACNEWS, NIC/QUERY, and other services provided by the Network Information Center (NIC) are detailed. Service centers and network contacts are discussed, a bibliography and glossary provided, and appendices discuss further areas of interest.

KEYWORDS: Defense Data Network; User's Guide

ACM CLASS: A.2 [General Literature]: Reference - User's Guide

Dewey, P.R. "Searching for Software." In *Popular Computing* 3/13 (Mid-October 1984): 137-141.

Software directories have multiplied almost as fast as the number of software titles. When attempting to select a directory, you need to ask several important questions: Which directories are available for the machine you own? Which directories offer independent reviews of software? What kind of information do you need (how detailed, etc.) and how quickly do you need it? How current must the information be, and how exhaustive? Which directories offer updates? How much do they cost? Information is provided on various software directories available in the USA including: printed directories, on-line and off-line databases, catalogs, and public domain sources. (INSPEC - Database of Institute of Electrical Engineers, UK)

KEYWORDS: Software Selection; Search Strategies

ACM CLASS: H.3.3 [Information Storage and Retrieval] Information Search and Retrieval - Search Process

Duvall, Lorraine M. *Software Data Repository Study*. Chicago, IL: IIT Research Institute, December 1976

The purpose of the Software Data Repository is to upgrade the software development process through collection, analysis, and dissemination of software development experience. A functional definition of the repository including a discussion of the inputs, processes, and outputs is presented in this report. The input processing and the requirements of an information system for storing and processing the data is discussed, along with a presentation of the recommendations for the repository including the development and operation of a pilot facility and the expansion of this facility into a fully operational center.

KEYWORDS: Software Repositories

ACM CLASS: D.2.2 [Software Engineering]: Tools and Techniques - Software Libraries

Edwards, B. "Software Library Management: An Expanding Role for the Information Professional." In *Online Conference Proceedings, Weston CT (1985)*: 93-97. Codex Corp., Mansfield, MA

In modern computer installations, the responsibility for ensuring that the information in a database is up to date and accurate is increasingly being assigned to a software librarian. He or she establishes controls for every type of transaction that results in a database change. Activities include categorizing information stored on magnetic disks and tapes; organizing system documentation; revising programs to ensure their validity; periodically backing-up programs and data. The necessary skills required and the methods by which a software librarian can bring order to an environment in need of controls is presented. Employers are benefiting from the fact that library trained personnel are now filling positions that once were solely offered to computer specialists. (INSPEC - Database of Institute of Electrical Engineers, UK)

KEYWORDS: Software Libraries; Software Management

ACM CLASS: K.6.3 [Management of Computer and Information Systems]: Software Management - Software Maintenance

Fidelman, M.R., J.G. Herman, and M.S. Baum. "Survivability of the Defense Data Network." In *Signal* 40/9 (May 1986): 148-150, 154-156.

Explores the architectural foundations of the Defense Data Network (DDN) survivability and its impact on Department of Defense (DoD) data communications users; and provides a brief description of the network, followed by a description of the stress scenario that the network has been designed to meet. The survivability of the DDN's basic technology, the specific survivability strategies built into the network and how the technology and strategies behave under simulated stress are discussed. Specific planning considerations for new subscribers are presented. The DDN is a packet switching data communications network intended to be DoD's primary wide area network for non-tactical applications. (INSPEC - Database of Institute of Electrical Engineers, UK)

KEYWORDS: Defense Data Network; Software Reliability

ACM CLASS: C.4 [Computer Systems Organization]: Performance of Systems - Reliability, Availability, and Serviceability

Frost, Carolyn O. "Subject Searching in an Online Catalog." In *Information Technology & Libraries* (March 1987): 60-64. School of Information & Library Studies, University of Michigan

This paper reports on one aspect of a larger study investigating student and faculty subject searching in a university on-line catalog. The research was conducted in May 1985 at the University of Houston-University Park (UH-UP) Library.

KEYWORDS: Search Techniques; Cataloging & Retrieval

ACM CLASS: H.3.3 [Information Storage & Retrieval]: Information Search & Retrieval - Search Process

Ghisio, O., and S. Truzzi. "An Extended Approach to Ada Software Reusability." In *CSELT (Technical Report) 15/1* (February 1987): 89-94. CSELT, Torino, Italy

Describes on-going research carried out at CSELT, whose goal is to find a new concept of the reusable Ada-component and a new approach for the organization of reusable Ada-components into a library, in order to address widespread reusability promoting a manual adaptation approach. In particular, a new kind of reusable component is suggested, based upon the idea of additional information, and a new concept of the component library is proposed, providing a structured access to the additional information. (COMPENDEX)

KEYWORDS: Reusable Software; Software Libraries

ACM CLASS: D.2.m [Software Engineering]: Miscellaneous - Reusable Software

Goguen, Joseph A., Karl N. Levitt. *Report on Ada Program Libraries Workshop*. Menlo Park, CA: Computer Science Laboratory, SRI International, 1-3 November 1983

In order to better understand the idea of a library of software components and the re-utilization of these components, a workshop on Ada Program Libraries was held at the Naval Postgraduate School, Monterey, CA, November 1-3, 1983. The scope of the workshop included concepts, problems, and approaches relevant to an on-line library system for creating, documenting and maintaining Ada systems.

KEYWORDS: Libraries; Ada Programming Language; Software Reusability

ACM CLASS: D.2.m [Software Engineering]: Miscellaneous - Reusable Software

Grabinger, R. Scott and Douglas Amedeo. "CRT Text layout: Prominent Layout Variables." In *Proceedings of the Annual Conference of the Association for Educational Communications and Technology Research and Theory Division*. (January 1985).

This study proposed to identify criteria used by people who view and make perceptual judgements about models of computer-generated text. To improve on the previous studies, this study used a complete set of carefully constructed stimuli and factor analysis techniques to analyze the resulting data. The goal was to identify criteria used by reader/perceivers to analyze the apparent effectiveness of several models of CRT screens, based on common text format variables. These criteria (factors or dimensions) can, in turn, be defined and eventually used as general design variables related to the perceptual/reading process rather than small, narrow typographical variables.

KEYWORDS: Text Processing; Pattern Recognition

ACM CLASS: H.3.1 [Information Storage & Retrieval]: Content Analysis & Indexing - Linguistic Processing

Hall, Patrick A.V. "Adding Database Management to Ada." In *ACM Ada Letters* 2/4 (January 1983): 88-91.

Systems developed using Ada will clearly need to store complex data over long periods. There is a need for some database management capability. The traditional approach has been to develop separate packages for use alongside the main programming language (e.g., DATE 75, CODA 1). That is not the way forward.

This paper outlines the approach required for Ada. The fundamental requirements for database implementations will be discussed in successive sections, and it will be shown how the requirement can be met within Ada as it is currently defined.

KEYWORDS: Ada Programming Language; Database Management

ACM CLASS: H.2.3 [Database Management]: Languages - Ada

Heffernan, Henry. "DoD to Publish Reusability Guidebook." In *Government Computer News* 5/21 (October 24, 1986): 70-71.

The reuse of software parts makes system development and maintenance faster and more efficient. This is of particular interest in the area of mission-control computer applications. The Department of Defense (DoD) Software Technology for Adaptable, Reliable Systems (STARS) program sponsored four workshops. The DoD project on software reusability will publish a guidebook in December 1986. (The Computer Database™)

KEYWORDS: Reusable Software; Software Design

ACM CLASS: D.2.m [Software Engineering]: Miscellaneous - Reusable Software

Heiden, H.B., and R.P. Bryan. "Defense Data Network: DoD Upgrades Its Communications." In *Government Data Systems* 14/1 (January 1985): 11-12, 14.

The Defense Data Network may be the pacesetter for all computer networks. It is solving the problems of dissimilar hosts, gateways to other networks, threats from hackers and more. (INSPEC - Database of Institute of Electrical Engineers, UK)

KEYWORDS: Defense Data Network; Communication Networks

ACM CLASS: C.2.0 [Computer-Communication Networks]: General - Data Communications

Herman, J.G., and S.L. Bernstein. "Monitoring, Control and Management of the Defense Data Network." In *IEEE EASCON Proceedings, New York, NY 1982*. 95-102. Bolt, Beranek and Newman (BBN), Inc., Cambridge, MA

Facilities for monitoring, control, and management will be provided by a set of monitoring centers (MCs), implemented in hosts at various locations, including one in each subnetwork formed by cryptographic boundaries. The MCs provide services for failure detection, isolation and correction, network configuration monitoring and control, traffic and performance data collection, and software maintenance and distribution. The Nu System, running on top of a Unix operating system and written entirely in the C language, supplies all the functionality required by the MCs in a highly integrated and flexible design. (INSPEC - Database of Institute of Electrical Engineers UK)

KEYWORDS: Defense Data Network; Network Management

ACM CLASS: C.5.0 [Computer System Implementation]: General Management

Horowitz, Ellis and John B. Munson. "An Expansive View of Reusable Software." In *IEEE Transactions on Software Engineering*.SE-10/5 (September 1984): 477-487.

The present crisis in software development forces us to reconsider the fundamental ways in which programming is done. One often quoted solution is to exploit more fully the idea of reusable software. It is the purpose of this paper to examine this concept in all of its forms and to assess the current state of the art. In addition to its usual meaning of reusable code, reusability includes reusable design, various forms of specification systems, so-called application generators, and systems for prototyping. We examine each approach from the perspective of the practicing engineer, and we evaluate the work in terms of how it may ultimately improve the development process for large-scale software systems.

KEYWORDS: Application Generators; Nonprocedural Languages; Prototyping; Reusability; Reusable Software; Specification; Specification Languages

ACM CLASS: D.2.m [Software Engineering]: Miscellaneous - Reusable Software

IEEE. *IEEE Standard for Software Configuration Management Plans (ANSI/IEEE Std 828-1983)*, Approved June 23, 1983.

This standard provides minimum requirements for preparation and content of Software Configuration Management (SCM) Plans. SCM Plans document the methods to be used for identifying software product items, controlling and implementing changes, and recording and reporting change implementation status.

KEYWORDS: Software Configuration; Standards

ACM CLASS: D.2.9 [Software Engineering]: Management - Software Configuration Management

Information Standards Organization. "Information Processing - Text and Office Systems - Standard Generalized Markup Language (SGML)." In *ISO 8879 1/86* (October 1986)

This International Standard specifies a language for document representation referred to as the "Standard Generalized Markup Language" (SGML). SGML can be used for publishing in its broadest definition, ranging from a single medium conventional publishing to multi-media data base publishing. SGML can also be used in office document processing when the benefits of human readability and interchangeability with publishing systems are required.

KEYWORDS: Information Processing; Documentation Standards; Logical Structure; Artificial Languages

ACM CLASS: D.2 O [Software Engineering]: General - Standards

Jones, Bill, Steve Litvintchouk, Jerry Mungle, Herb Krasner, John Mellby, and Herb Willman. "Issues in Software Reusability." In *ACM SIGSOFT Software Engineering Notes* 10/2 (April 1985): 108-109.

Discusses software reusability in terms of reusable componentry. The authors raise the issue of component specification and recommend that a language independent notation be developed. They also recommend that reusable components be designed at a high level of quality, reliability and maintainability as befitting expectancy of broader use. This raises issues of management intensities which are discussed. The state of practice is then discussed first considering experiences of NASA-Ames, then the Japanese software factory approach. The short term and long term thrusts for achieving the recommendation are then outlined. (INSPEC - Database of Institute of Electrical Engineers, UK)

KEYWORDS: Software Reusability; Software Reliability

ACM CLASS: D.2.m [Software Engineering]: Miscellaneous - Reusable Software

Kubat, Michael E. "Modularity is Key to Interfacing the Defense Data Network." In *EDN* (20 August 1987): 147-154.

When designing an interface to connect to the DDN, you are better off using small independent software modules and separate hardware functions. The modules need to be flexible enough to adapt to future DDN modifications and the probable switch to OSI protocol standards.

KEYWORDS: Defense Data Network; Modularity; Software Standards

ACM: D.2.2 [Software Engineering]: Tools & Techniques - Modules & Interfaces

Lubars, Mitchell D. "Affording Higher Reliability Through Software Reusability." In *Software Engineering Notes* 11/5 (October 1986): 39-42. Dept. of Computer Science, University of Illinois, Urbana, IL 61891

The Japanese Software Factory example illustrates that significantly improved productivity can be achieved through software reuse. What is required is to generate code and abstractions (e.g., schemas and plans), which are developed with the intention of reusability. This will not only result in higher productivity, but higher reliability as well. In order to support these arguments, a simple economic model of reuse is introduced. We then use that model to show that much higher levels of reliability are feasible with highly reusable software. (INSPEC - Database of Institute of Electrical Engineers, UK)

KEYWORDS: Software Reliability; Software Reusability

ACM CLASS: D.2.4 [Software Engineering]: Program Verification - Reliability

Lunsford, A. *SLIB77: Source Library File Maintenance System*. Department of Energy, Sacramento, CA, Western Area Power Administration

SLIB77 is a source librarian program designed to maintain FORTRAN source code in a compressed form on magnetic disk. The program was prepared to meet program maintenance requirements for ongoing program development and continual improvement of very large programs involving many programmers from a number of different organizations. SLIB77 automatically maintains in one file the source of the current program as well as all previous modifications. Although written originally for FORTRAN programs, SLIB77 is suitable for use with data files, text files, operating systems, and other programming languages, such as Ada, C, and COBOL. It can handle libraries with records of up to 160 characters. Records are grouped into DECKS and assigned deck names by the user. SLIB77 assigns a number to each record in each deck. Records can be deleted or restored singly or as a group within each deck. Modification records are grouped and assigned modification identification names by the user. The program assign numbers to each new record with the deck. The program has two modes of execution, BATCH and EDIT. The BATCH mode is controlled by an input file and is used to make changes permanent and created new library files. The EDIT mode is controlled by interactive terminal input, and a built-in line editor is used for modification of single decks. Transferring of a library from one computer system to another is accomplished using a Portable Library File created by SLIB77 in a BATCH run. Other features of SLIB77 include: user-controlled switches which can be used to control records being placed onto the compile file, the capability of reverting to an earlier library condition, options for controlling listings of deck records, provisions such that if a COMMON deck is modified all decks which call it will automatically be updated, and groups of records within a COMMON deck may be given a group name and selectively incorporated into any deck.

KEYWORDS: Software Libraries; Software Maintenance

ACM CLASS: D.4.3 [Operating Systems]: File Systems Management - Maintenance

Malone, Thomas W., Kenneth R. Grant, Franklyn A. Turbak, Stephen A. Brobst, and Michael D. Cohen. "Intelligent Information-Sharing Systems." In *Communications of the ACM* 30/5 (May 1987): 390-402.

Much of the work that has been done on computer-mediated communication systems (e.g., electronic mail, computer conferencing, and electronic bulletin boards) has focused on technical capabilities and standards for transporting and storing messages. This paper will focus on a more general problem, the information-sharing problem, which has to do with disseminating information so that it reaches those people to whom it is valuable without interfering with those to whom it is not. Characterization of these approaches will be illustrated with examples from a series of informal studies that have been conducted on how people share information in organizations, and through a description of an intelligent information-sharing system that was developed called the Information Lens.

KEYWORDS: Computer Networks; Artificial Intelligence

ACM CLASS: H.4.3 [Information Systems Applications]: Communications Applications - Design

Maybaum, F.L., and H.C. Duffield. "Defense Data Network - An Overview." In *IEEE MILCOM Proceedings*. New York, NY. 1986

The Defense Data Network (DDN), its scope and implementation strategy, are described. This is followed by a description of the DDN today in terms of its hardware elements, protocols, architecture and topology. Planned and projected improvements for the evolution of the DDN in the 1980s and its maturation in the 1990s are reported. (COMPENDEX)

KEYWORDS: Defense Data Network; Computer Networks

ACM CLASS: C.2.0 [Computer-Communication Networks]: General - Data Communications

McCain, R. *A Software Development Methodology for Reusable Components*, In Conference Proceedings. Houston, TX: Division of Federal Systems, IBM. pp 319-324.

Software reusability could potentially provide substantial economic benefits. Large-scale software component reuse, however, will not be possible without a software development approach that emphasizes the production of reusable software components. This paper defines the characteristics of reusable software and proposes a software development methodology that produces software components exhibiting these characteristics. The methodology is intended to supplement rather than replace other sound software development methodologies. In addition to describing the reusability-oriented thought process associated with the methodology, the paper suggests new work products and validation procedures to support the methodology. (COMPENDEX0

KEYWORDS: Reusable Software

ACM CLASS: D.2.m [Software Engineering]: Miscellaneous - Reusable Software

McCune, Brian P., Richard M. Tong, Jeffrey S. Dean, and Daniel G. Shapiro. "RUBRIC: A System for Rule-Based Information Retrieval." In *IEEE Trans Software Engineering* SE-11/9 (September 1985): 939-944.

A research prototype software system for conceptual information retrieval has been developed. The goal of the system, called RUBRIC, is to provide more automated and relevant access to unformatted textual databases. The approach is to use production rules from artificial intelligence to define a hierarchy of retrieval subtopics, with fuzzy context expressions and specific word phrases at the bottom. RUBRIC allows the definition of detailed queries starting at a conceptual level, partial matching of a query and a document, selection of only the highest ranked documents for presentation to the user and detailed explanation of how and why a particular document was selected. Initial experiments indicate that a RUBRIC rule set better matches human retrieval judgment than a standard Boolean keyword expression, given equal amounts of effort in defining each. The techniques presented may be useful in stand-alone retrieval systems, front-ends to existing information retrieval systems, or real-time document filtering and routing.

KEYWORDS: Rule-Based Retrieval; Artificial Intelligence; Evidential Reasoning; Expert Systems; Information Retrieval

ACM CLASS: H.3.3 [Information Storage and Retrieval]: Information Search and Retrieval - Retrieval Models

Meadow, C.T. "User Adaptation in Interactive Information Retrieval." In *Journal of the American Society for Information Science* 34/4 (July 1983): 289-291. Dialog Information Services, Inc., Palo Alto, CA 94304.

A study into the behavior of users of an information retrieval system was done to measure changes in user performance and user attitude. Subjects were grouped by the level of their prior experience in the area, and by the complexity of the language they used. The major conclusions were that to be successful, languages must be designed with specific user groups and applications in mind, and that prior experience is the most consistent factor in predicting user performance. (LISA - Library Association Publications LTD, UK)

KEYWORDS: Search Strategy; User/System Interaction; On-Line Searching; Query Languages; Performance; Measurement

ACM: H.3.3 [Information Storage & Retrieval]: Information Search & Retrieval - Human Factors

Metcalf, S.G. *Software Library: A Reusable Software Issue*. Monterey, CA: Naval Postgraduate School (MS Thesis), June 1984

This thesis presents a conceptual view of a reusable Software Library. Issues concerning the software crisis and its subsequent impact on software development are reviewed. The traditional library is described for the purpose of comparison with the Software Library. A particular example of the Software Library, the Program Library, is described as a prototype of a reusable library. A hierarchical structure for a Program Library is discussed as an approach to making the library entities easily accessible and retrievable. The role of application generators in the Program Library is described. The special features of Ada that support programming libraries are described. Finally, noncode products in the Software Library are discussed. (DTIC)

KEYWORDS: Reusable Software; Software Libraries

ACM CLASS: D.2.m [Software Engineering]: Miscellaneous - Reusable Software

Miller, R. K. *Defense Data Network Service Access Protocols*. McLean, VA: MITRE Corp., C3 Division, February 1984.

This document presents the protocol specifications for the service access layer of the Defense Data Network (DDN) Host Front-end Protocol (HFP). The service access layer is responsible for the interpretation of the commands and the responses that are exchanged between a host and the Host Front End Processor (HFEP) configuration of the DDN Network Access Component. Specifications are defined to support communications with the Transmission Control Protocol (TCP) and the Internet Protocol (IP) implementation in the HFEP.

KEYWORDS: Defense Data Network; Protocols

ACM CLASS: C.2.2 [Computer-Communication Networks]: Network Protocols - Protocol Verification

MITRE, Inc. *Defense Data Network Subscriber Interface Guide*. McLean, VA, July 1983.

Subscribers of the Defense Data Network (DDN) will be responsible for interfacing their host systems and terminals to the network. This Guide describes the methods of interconnection that are available to DDN subscribers and the strategies to obtain these interfaces. The Guide also describes the communications technology used by the DDN and provides a summary of the services offered by the network as well as the protocols that support these services. Appendix A is a detailed interface specification which could be included in subscriber acquisition packages.

KEYWORDS: Defense Data Network; Interfaces; User Needs

ACM CLASS: C.0 [General]: - Hardware/Software Interfaces

MITRE Inc. *Defense Data Network Subscriber Security Guide*. McLean, VA, November 1983

This guide describes the security architecture now being implemented for the Defense Data Network (DDN). The architecture will be used until around 1987 when improved security devices are expected to be available. The guide describes how the architecture will then evolve.

KEYWORDS: Defense Data Network; Computer Security

ACM CLASS: C.2.0 [Computer-Communication Networks]: General - Security and Protection

MountainNet. *AdaNET: The Advanced Development Network for Ada Software Applications*. Dellslow, WV, October 1987.

This pamphlet outlines the origins of AdaNET and gives some general insight into its development. Discusses effect on small businesses in local area which now have access to large mainframe capabilities, through MountainNET.

KEYWORDS: Software Repositories; Ada Programming Language; Computer Networks

ACM: D.2.2 [Software Engineering]: Tools & Techniques - Software Libraries

National Aeronautics and Space Administration. *COSMIC Software Submittal Guidelines*. Athens, GA, January 1987.

These guidelines detail the procedure for submitting software to the COSMIC software repository. Includes checklist and submittal form as well as general information about hardware/software specifications, documentation requirements, etc.

KEYWORDS: Software Repositories; Software Standards

ACM: D.2.0 [Software Engineering]: General - Standards

Nourani, C.F., and G.A. Jones. *Software Reusability - A Perspective*, In Conference Proceedings 2. Waltham, MA: Computer Sciences Lab., GTE Laboratories.

An overall methodology for program synthesis which emphasizes reusability is outlined. A case is made for techniques which combine generic modules with executable specifications. Specifications are combined and composed to produce new module specifications. Through minor modifications to the specifications, a new instance of a module is produced which can be used in (abstract) implementation and its relationship to reusability, thus defining reusable implementation. The methodology involves program transformation as well as instantiations of generic modules. Modules are first implemented abstractly and then transformed to efficient executable code through an iterative transformation process. Compiler optimization and code generation are examples of low level transformations. Instantiations of parameterized library code units, and mappings from higher level domain languages are examples of high level transformations. The methodology puts the recently highlighted goal of software reusability in a particular perspective. (COMPENDEX)

KEYWORDS: Reusable Software; Generic Modules

ACM CLASS: D.2.m [Software Engineering]: Miscellaneous - Reusable Software

Office of Under Secretary of Defense for Research & Engineering. *Defense Science Board Task Force on DDN*. Washington, D.C., 30 August 1985

In May 1983, the Defense Science Board established a new Task Force to review, evaluate, and make recommendations concerning the continuing evolution of the Defense Data Network Program. Since that time, the DDN Task Force addressed a number of issues that have arisen as the Program has gained momentum, achieved new status, and encountered a number of plaguing problems. This report provides the observations and recommendations generated by that review. The most significant concern of the Task Force surrounds the DDN Security Architecture and the evolution of security may well be one of the most critical challenges facing DoD. DDN, as a global common-user data communications network, will be subject to this challenge as much as, if not more, than any other system. The Task Force has therefore recommended that major emphasis be placed on the DDN Security Architecture, a detailed security plan and on establishing an independent

group to periodically review and assess the progress of the DDN and other relevant security programs in this area.

KEYWORDS: Defense Data Network

ACM CLASS: A.m [General Literature]: Miscellaneous - Background

Palmer, James, D., and Tan Nguyen. "Systems Approach to Reusable Software Products." In *IEEE Proceedings* (1986): 1410-1414. George Mason University, Fairfax, VA

A systems methodology has been utilized to investigate the potential of developing reusable software products and reducing the costs of software development. Through the application of delta chart procedures, the software life cycle has been analyzed and the concept of the reusable software module has been formulated. Within the reusability module, decision-support systems to aid the software engineer are proposed. These include knowledge-based systems, simple go-no-go gates, and traditional decision-support systems. (COMPENDEX)

KEYWORDS: Software Reusability; Decision Support Systems

ACM CLASS: D.2.10 [Software Engineering]: Design - Methodologies

Penedo, Maria H., Steven P. Wartik. "Reusable Tools for Software Engineering Environments." In *American Institute of Aeronautics and Astronautics, Inc.* (1985): 465- . TRW; University of Virginia

Software reusability is a key element for increasing the productivity of software projects. It is also one of the key requirements in the building of a software engineering environment. This paper describes two of the reusable tools which have been built as part of the TRW software development environment. The first tool is a man-machine interface package which supports a fill-in-the-blank user interface; the other tool is a general purpose Forms Management System which makes use of the man machine package. We also discuss our experiences in the building and use of these tools, emphasizing reusability and user interface aspects.

KEYWORDS: Software Reusability; User Interfaces

ACM CLASS: D.2.M [Software Engineering]: Miscellaneous - Reusable Software

Plunkett, P.L. "The Defense Data Network: A New Look at the Host Interface." In *IEEE EASCON Proceedings* (1984): 55-59.

The Defense Data Network (DDN) has in two years evolved from roots in the Arpanet research community into a mission-oriented communications service for US Department of Defense (DoD) systems in the continental United States, Europe, and the Pacific, with near-term plans to expand to the Mediterranean and Panama. With some 400 host computers already registered for DDN service, an enormous growth is expected in the population of more than 400 hosts already on-line. The adoption by DoD of X.25 for the DDN, coupled with a discussion of the DDN internet functionality, provides the rationale for an alternate approach to building host interface products. The author describes a low-risk incremental approach vendors may take to provide a DDN interface capability within their X.25 standard product lines. (COMPENDEX)

KEYWORDS: Defense Data Network; Interfaces

ACM CLASS: C.0 [Computer Systems Organization]: General - Hardware/Software Interfaces

Rothenberg, Laurence, Darrell L. Ward, and David J. Mishelevich. "The Logical Structure and Use of a Relational Clinical Data Management System." In *Proceedings of the 13th International Conference on System Science, Honolulu* (1980): 159-168.

The relational database environment is utilized to characterize the clinical data management model. The user perspective of the relational clinical database management system (CDMS) is described. The user interface within the system, Hypertext, is illustrated, as well as the components controlling data entry, update, patient inquiry and general reporting and retrieval functions. The patient collection component is presented emphasizing the data independence and features assisting the user in the entering of the clinical data. The implementation approach is briefly described in order to illustrate the general purpose nature of the system and the viability of quickly creating new applications within the clinical environment. The retrieval facility is addressed providing a clear view of the tools available to the clinician from a retrieval and reporting perspective. The feasibility of clinicians performing all retrieval functions independent of a database administrator or a sophisticated user is addressed for the model and environment presented herein. Finally, some areas where additional attention should be directed are indicated with emphasis on the usability of new tools by the end-user.

KEYWORDS: Relational Databases; Database Management; Hypertext; User Interfaces

ACM CLASS: H.3.2 [Information Storage & Retrieval]: Information Storage - File Organization

Ryder, Barbara G. and Marvin C. Paull. "Elimination Algorithms for Data Flow Analysis." In *ACM Computing Surveys* 18/3 (September 1986): Department of Computer Science, Rutgers University, New Brunswick, NJ.

A unified model of a family of data flow algorithms, called elimination methods, is presented. The algorithms, which gather information about the definition and use of data in a program or a set of programs, are characterized by the manner in which they solve the systems of equations that describe data flow problems of interest. The unified model provides implementation-independent descriptions of the algorithms to facilitate comparisons among them and illustrate the sources of improvement in worst case complexity bounds. This tutorial provides a study in algorithm design, as well as a new view of these algorithms and their interrelationships.

KEYWORDS: Data Flow Analysis; Elimination Algorithms; Languages

ACM CLASS: D.3.4 [Programming Languages]: Processors - optimization

Salton, G. "Another Look at Automatic Text-Retrieval Systems." In *Communications of the ACM* 29/7 (July 1986): 648-656.

An automatic text-retrieval system is designed to search a file of natural-language documents and retrieve certain stored items in response to queries submitted by a user. Typically, each stored item is described by using -- for content identification - certain words contained in the documented texts, sometimes supplemented by additional related information.

The effectiveness of a retrieval system is usually evaluated in terms of a pair of measures, known as recall and precision. Recall is the proportion of relevant material actually retrieved from the file, while precision is the proportion of the retrieval material that is found to be relevant to the user's needs. In principle, a search should achieve high recall by retrieving almost everything that is relevant while at the same time maintaining high precision by rejecting a large proportion of extraneous items.

This article presents some major experiments comparing automatic retrieval with manual, controlled vocabulary systems on large document collections. The theories underlying automatic indexing are addressed and a basic blueprint for implementing effective automatic retrieval systems is proposed.

KEYWORDS: Text Retrieval; Automatic Indexing; Retrieval Methods

ACM CLASS: H.3.3 [Information Storage and Retrieval]: Information Search and Retrieval - Retrieval Models

Salton, G. and M. McGill. *Introduction to Modern Information Retrieval*. New York: McGraw-Hill, 1983.

The text is aimed at increasing the understanding of modern information retrieval, and covers the basic aspects of information retrieval theory and practice. In addition, the various techniques used in the design and evaluation of complete retrieval systems are discussed. The text concentrates on the description of concepts, functions, and processes of interest in retrieval rather than on the detailed operation of any one existing retrieval system.

The book can also serve the professional reader as an introduction to the design and operations of information retrieval and management information systems.

KEYWORDS: Information Retrieval; Management Information Systems; Search Methods; Indexing Methods

ACM: H.3.0 [Information Storage and Retrieval]: General - Introductory & Survey

Schefter, Jim. "Super Searcher". In *Popular Science* (December 1987): 60-.

Built initially for special military tasks, the Fast Data Finder can zip through phenomenally huge data bases at more than nine million characters a second, locating specific information. Now models are on the way for personal computers and commercial use. (INSPEC, The Computer Database™, Microcomputer Index, LISA, COMPENDEX)

KEYWORDS: Search Models; Information Retrieval

ACM CLASS: H.3.3 [Information Storage & Retrieval]: Information Search and Retrieval - Search Process

Schneider, J.S., C.E. Bowen. "Using an Index for More Flexibility." In *80 Micro* 59 (December 1984): 136, 138-139.

Through the use of automatic indexing techniques, data base information retrieval can be enhanced. The technique uses pointers to direct the search through a hierarchy of indices so that the entire data base does not have to be searched. The speed of indexing is increased through the use of Assembly Language Drivers, which are called from the main BASIC program. This application employs 48K of RAM and two disk drives. (The Computer Database™)

KEYWORDS: Automatic Indexing; Personal Computers; Information Storage and Retrieval; Data Bases; On-Line Searching

ACM CLASS: H.3.1 [Information Storage & Retrieval]: Content Analysis & Indexing - Indexing Methods

Schobbens, Pierre-Yves. *Reuse in a Project Support Environment* (Draft Paper). Passau, Austria:Universitaet Passau , March 28, 1987

This paper describes various existing and foreseen techniques for software reuse. It discusses the impact of those techniques on project support environments. (Author)

KEYWORDS: Reusable Software

ACM CLASS: D.2.m [Software Engineering]: Miscellaneous - Reusable Software

STARS JPO. *Software Technology for Adaptable, Reliable Systems (STARS) Competing Primes Contracts*. Washington, DC: U.S. Department of Defense, September 1987

Several years ago, the DoD became painfully aware that software costs were far exceeding those of hardware. Further, the DoD was forced to manage a multitude of operating systems and software programs that were incompatible. In 1983, the STARS program was established to pursue the DoD goal of dramatically improving software quality while reducing associated costs. This Solicitation addresses the competing primes part of that effort. It consists of a basic contract and many individually awarded delivery orders which address specific topics.

KEYWORDS: STARS; Software Technology; Software Reusability

ACM CLASS: A.2 [General Literature]: Reference - Management

STARS JPO. *Software Technology for Adaptable, Reliable Systems (STARS) Program Management Plan*. Washington, DC: U.S. Department of Defense, 6 August 1986.

Software Technology for Adaptable, Reliable Systems, or STARS, is the Defense Department's program to achieve dramatic improvements in software quality and to mitigate runaway software costs. The Under Secretary of Defense for Research and Engineering (USDRE) directed the STARS Program Director to expeditiously develop and annually update technical and management plans for approval by the STARS Executive Committee. This management plan responds to the USDRE direction.

KEYWORDS: STARS; Software Technology; Software Reusability

ACM CLASS: A.2 [General Literature]: Reference - Management

STARS JPO. *Software Technology for Adaptable, Reliable Systems (STARS) Technical Program Plan*. Washington, DC: U.S. Department of Defense, 6 August 1986.

Software Technology for Adaptable, Reliable Systems, or STARS, is the Defense Department's program to achieve dramatic improvements in software quality and to mitigate runaway software costs. The Under Secretary of Defense for Research and Engineering (USDRE) directed the STARS Program Director to expeditiously develop and annually update technical and management plans for approval by STARS Executive Committee. This technical plan responds to the USDRE direction.

KEYWORDS: STARS; Software Technology; Software Reusability

ACM CLASS: A.2 [General Literature]: Reference - Management

Stone, David E., Margaret McMinn, Anita Marx, Larry Israelite and Lois Wilson. *A Hypertext Electronic Job Aid for Maintenance*. McLean VA: Hazeltine Corporation, 30 November 1982

One of the most important tasks facing the military services today is that of maintaining complex weapons systems. Unfortunately, this task is not always adequately performed despite its importance. Electronic job aids have the potential to help Army personnel significantly improve maintenance of complex equipment, provided that the technical information that they present is complete, accurate, and easy to understand and use. This report describes the use of TICCIT Hypertext Display System to permit technicians of varying levels of expertise to access technical information describing the M-1 tank antenna maintenance procedure.

KEYWORDS: Performance Maintenance; Computer-Aided Maintenance; Computer Graphics; Hypertext

ACM CLASS: D.4.3 [Operating Systems]: File Systems Management - Maintenance

Tesky, F.N. "Information Retrieval Systems for the Future." In *Library and Information Research Report 26* (1984). British Library Lending Division, Boston Spa, Wetherby, West Yorkshire.

The first part of this report describes those functions of free-text information retrieval systems which are regarded as fundamental by a number of users. In addition to these existing functions a number of future requirements for information retrieval systems are discussed. The second part of the report describes some existing and proposed hardware and software methods for implementing free-text information retrieval systems. Emphasis is placed on methods of improving the functionality of the system rather than on methods of increasing the performance. The third part of the report proposes a design for a new information retrieval system. The proposal is based on the use of the Binary Relationship Model for information storage and retrieval, and an interactive graphical display for the user interface.

KEYWORDS: Text Retrieval; Information Retrieval Systems

ACM CLASS: H.3 [Information Storage & Retrieval]: Information Search & Retrieval - Retrieval Models

Volpano, Dennis M, and Richard B. Kieburtz. "Software Templates." In *IEEE Software Engineering Proceedings* (1985): 55-60. Oregon Graduate Center, Beaverton, OR.

Software components often cannot be reused since the algorithms they realize are encoded in terms of particular implementations. An approach to reusability is presented in which algorithms and implementations are specified separately. An algorithm is specified by a sequence of recursion equations called a software template. Templates are defined over values of abstract data types whose implementations are specified separately and catalogued. When a template's data types are bound to catalogued implementation, the template is automatically translated into a component tailored to the chosen implementations, a process called template instantiation. Different implementations of an algorithm can be achieved by merely binding the data types of its template specification to different implementations. (COMPENDEX)

KEYWORDS: Software Reusability; Software Templates

ACM CLASS: D.2.m [Software Engineering]: Miscellaneous - Reusable Software

Ward, Darrell L., Phillip L. Crews and Thomas C. Irby. *An Organizational Model and Tool to Support Software Development*. Denton, TX: North Texas State University.

This paper describes the results of a software development project which used Hypertext on a microprocessor as a supporting organization and development tool. The development of the components of a system supporting data entry to a System 2000 database is illustrated as they originated and grew within the Hypertext model. The resulting model is described to show the effectiveness of the organizational aspects of this tool. Finally, the efforts ongoing at North Texas State University to produce valuable information pertinent to the development of reliable and lasting software products are documented.

KEYWORDS: Hypertext; Information Retrieval; Software Development; Software Reliability

ACM CLASS: D.2.2 [Software Engineering]: Tools & Technologies - User Interfaces

Wong, W. *Management Overview of Software Reuse*. Washington, DC: National Bureau of Standards, (September 1986).

With skyrocketing software costs, both Federal and private sector organizations are increasingly interested in finding ways to improve software quality and productivity, and reduce software risks. Software reuse is one promising method of accomplishing this objective. This report presents a management overview of the problems and issues related to software reuse. It provides a description of software reusability and its scope. The necessity of technical and management involvement to achieve greater levels of software reuse is emphasized.

KEYWORDS: Reusable Software; Software Management

ACM CLASS: D.2.m [Software Engineering]: Miscellaneous - Reusable Software

Woodfield, S.N., D.W. Empley, G.L Stokes, and K. Zhang. "Assumption and Issues of Software Reusability" In *IEEE COMPCOM Proceedings*. Department of Computer Science, Brigham Young University, Provo UT

Reuse of previously validated software components can significantly increase programming productivity. The authors discuss basic assumptions and address problems and issues encountered when trying to reuse software modules. They speculate on some possible solutions and on the type of tools which should be built. Finally, they describe some research being conducted at Brigham Young University. (COMPENDEX)

KEYWORDS: Reusable Software; Software Tools

ACM CLASS: D.2.m [Software Engineering]: Miscellaneous - Reusable Software

Woodfield, Scott N. "Object Oriented Libraries." In *IEEE Proceedings* (1985): 42-45. Brigham Young University, Provo UT

The author has developed a library system which allows the inclusion within the library of modules which may be functions or objects (represented by data abstractions). A description is given of the rationale behind the need for such a system, and also the need for the abstraction mechanisms, aggregation, classification, and generics. A prototype which has been built and tested to demonstrate these concepts is also described.(COMPENDEX)

KEYWORDS: Object Oriented Languages; Software Libraries

ACM CLASS: D.2.m [Software Engineering]: Miscellaneous - Reusable Software

Yamamoto, Shuichiro; and Sadahiro Isoda. SoftDA - A Reuse Oriented Software Design. In *IEEE COMPSAC Proceedings* (1986): 284-290. NTT, Japan.

A discussion is presented of the reuse-oriented software design system SoftDA (Software Design Automation), which provides extensive support for software reuse including revision of existing programs. The main objectives of this system are (1) to acquire related information that used to be lost in the course of conventional software development; (2) to store documents and program codes with their key elements interrelated in a network to facilitate software reuse. (COMPENDEX)

KEYWORDS: Software Reusability; Software Design Automation

ACM CLASS: D.2.10 [Software Engineering]: Design - Methodologies

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